

IN THE CLAIMS:

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- 1 1. An optical micro-electromechanical device, comprising:
2 a substrate; and
3 a mirror assembly suspended above said substrate, said mirror assembly
4 including:
5 a torsional beam attached to said substrate,
6 a cantilever with a cantilever first end and a cantilever second end, said
7 cantilever first end being attached to said torsional beam, said cantilever
8 second end supporting a mirror head,
9 a connector attached to said torsional beam, and
10 a counterweight attached to said connector.

- 1 2. The optical micro-electromechanical device of claim 1 wherein said
2 counterweight has a set of apertures formed therein.

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- 1 3. The optical micro-electromechanical device of claim 1 wherein a region of
2 said substrate under said counterweight is configured as an isolation region.

- 1 4. The optical micro-electromechanical device of claim 3 wherein said isolation
2 region is doped to provide electrical isolation between said counterweight and said
3 isolation region.

- 1 5. The optical micro-electromechanical device of claim 3 wherein said isolation
2 region includes a deposited passivation surface.

- 1 6. The optical micro-electromechanical device of claim 3 wherein said isolation
2 region includes a trench to facilitate spatial isolation between said isolation region and
3 said counterweight.

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- 1 7. The optical micro-electromechanical device of claim 1 configured as a laser.

1 8. The optical micro-electromechanical device of claim 1 configured as an
2 optical detector.

1 9. The optical micro-electromechanical device of claim 1 configured as an
2 optical filter.

1 10. The optical micro-electromechanical device of claim 1 configured as an
2 optical amplifier.

1 11. The optical micro-electromechanical device of claim 1 configured as an
2 optical attenuator.

1 12. A method of operating an optical micro-electromechanical device, said
2 method comprising the steps of:
3 positioning a mirror assembly over a substrate, said mirror assembling
4 including a torsional beam attached to said substrate, a cantilever with a cantilever
5 first end and a cantilever second end, said cantilever first end being attached to said
6 torsional beam, said cantilever second end supporting a mirror head, a connector
7 attached to said torsional beam, and a counterweight attached to said connector; and
8 applying an electrical bias to said substrate so as to create an electrostatic
9 attraction between said counterweight and said substrate, which causes said torsional
10 beam to rotate and thereby re-reposition said mirror head.

1 13. The method of claim 12 wherein said applying step includes the step of
2 applying said electrical bias to said substrate so as to re-position said mirror head to
3 create a red-shift of filter wavelength.

1 14. The method of claim 12 wherein said applying step includes the step of
2 applying said electrical bias to said substrate so as to re-position said mirror head to
3 create a blue-shift of filter wavelength.

1 15. The method of claim 12 wherein said positioning and applying steps are
2 performed such that said mirror assembly operates as a laser.

1 16. The method of claim 12 wherein said positioning and applying steps are
2 performed such that said mirror assembly operates as an optical detector.

1 17. The method of claim 12 wherein said positioning and applying steps are
2 performed such that said mirror assembly operates as an optical filter.

1 18. The method of claim 12 wherein said positioning and applying steps are
2 performed such that said mirror assembly operates as an optical amplifier.

1 19. The method of claim 12 wherein said positioning and applying steps are
2 performed such that said mirror assembly operates as an optical attenuator.

1 20. The method of claim 12 further comprising the step of isolating said
2 counterweight from said substrate.

1 21. The method of claim 20 wherein said isolating step includes the step of
2 electrically isolating said counterweight from said substrate.

1 22. The method of claim 21 wherein said isolating step includes the step of
2 electrically isolating said counterweight from said substrate through doping.

1 23. The method of claim 21 wherein said isolating step includes the step of
2 electrically isolating said counterweight from said substrate with a passivation
3 surface.

1 24. The method of claim 21 wherein said isolating step includes the step of
2 spatially isolating said counterweight from said substrate.

